Thornton Creek Confluence Improvement Project
SPU Follow-Up on 60% Design Review Comments and Questions
11/8/2012

Seattle Public Utilities (SPU) asked for comments and questions on our 60% design plans for the Thornton Creek Confluence Improvement Project from the community in several ways. This included a public meeting on August 2, a site drop-in session on August 4, posting design plans to the web, and asking for input via emails through August 31, 2012. Thank you to those who provided their input, suggestions and questions – we truly appreciate it!

SPU took September and October to assess the feedback and decide how to complete the project design. This document identifies SPU's process for evaluating suggested design changes and our decisions for whether to include each suggestion. We will meet with the community to discuss this on November 14, 2012.

Suggested Changes to the Design

SPU asked for feedback on several elements of the project: removal of poplar trees along the south branch of the stream, a path or an overlook in the project area, and parking along 36th Ave NE. We also received suggestions to modify the designs to preserve trees and possibly enhance the experience of the area for visitors.

SPU and the project designers held two workshops to discuss these design elements and evaluate the potential changes based on the project objectives. Table 1 lists the project objectives, additional concerns and the information we examined for each. The major points of discussion and SPU's direction for each proposed change are discussed in the following section and summarized visually in Figures 1 and 2.

Table 1: Project objectives, additional concerns and information SPU considered while evaluating design changes to the Confluence project.

Project Objectives	Information Examined
Meet 35th drainage service levels: road does not flood at or below 25 year storm event	No proposed changes affected the 35th Ave NE culvert, so this objective was not examined during our analysis.
Remove flow choke point at 35th culvert site: reduce downstream peak flow velocities	No proposed changes affected the 35th Ave NE culvert, so this objective was not examined during our analysis.

Reduce downstream peak flow velocities	Examined storage volume and peak flow delay. The 100-year storm event flow in the main stem of Thornton Creek is estimated at 900 cubic feet per second (cfs) or 33 cubic yards (CY) per second. Based on this, we can approximate changes in peak flow delay based on flood storage volume. Basically, 10 CY of storage in the confluence area equals 0.3 second of peak flow delay. The south branch of Thornton Creek 100-year flow is approximately 460 cfs, and 10 CY of storage delays the peak flow by about 0.6 second. The peak flow delays are more significant at lower flows, which are also more common. For example, at a bank full flow of 205 cfs, 10 CY of storage provides about 1.4 seconds of delay.
Improve instream spawning and rearing habitat	Evaluated changes in stream length and area, hyporheic zone, instream wood, and size and continuity of riparian and vegetated stream buffer.
Improve maintenance crew safety	Evaluated how proposal would affect worker safety while accessing site or performing maintenance.
Improve water quality	No proposed changes affected the hyporheic zone or water quality improvements, so this objective was not examined during our analysis.
Financial implications for construction	Cost of the change.
Resource implications for maintenance	Does the change require more or less maintenance than the original plan?
Additional Concerns	**Information Examined**
Maintaining trees and other plants to extent possible	Number of trees or size of vegetated area that would be saved or lost when compared to the original design.
Public safety and security	How would the proposed change affect illicit behaviors or other security concerns in the area?
Aesthetics of site	How would the change affect the aesthetics?
Passive recreation opportunities	How would the proposed change affect passive use of the site?
Schedule Impacts	Does the proposed change significantly affect the project schedule?

Proposed Changes

1. **Removal of poplars west of 35th**: During review of the 60% design, we asked the community for their input on removing poplars upstream of 35th Ave NE in order to increase the amount of flood storage area.

   Discussion and Decision:
   The majority of public input supported removing the poplars to provide increased flood storage. We have had a few discussions with the Seattle School District, which owns the land, and they are generally supportive of removing the poplars for additional flood storage as well. Thirteen poplars will be removed downstream of the pedestrian bridge that connects with the high school stadium area. The trees will be replaced at a 2:1 ratio, consistent with Executive Order 03-05 (2005; Clerk File #307611), spread throughout the entire Thornton Creek Confluence Improvement Project site. Poplars as a species will not be replanted. Instead we will use a mix of native conifers and deciduous trees appropriate for an urban riparian area.

2. **Retain more plants upstream of 35th Ave NE**: The proposed 60% design of the area upstream of 35th Ave NE, adjacent to the high school and community center, would remove the majority of the existing vegetation next to the stream and the small tributary that flows between the community center parking lot and the baseball field. A past volunteer effort planted a large area that would be removed under the original 60% design. SPU received a suggestion to modify the design to preserve more of the volunteer-planted area.

   Discussion and Decision:
   SPU is concerned with two items in this area: 1) increasing flood storage and 2) reducing sediment deposition at the mouth of the small tributary that promotes flooding of the community center parking lot and ball field. The 60% design addressed these items, but with a large effect on the plants in the area. SPU examined the proposal to balance flood storage, sediment movement and existing native plants. We plan to modify the grading of the area to maintain more of the plantings, with minimal loss of flood storage. The decrease in flood storage on the south side of the stream will be offset by increasing the storage area to the west. This change will maintain the amount of flood storage available during the 25-year event and will slightly reduce the flood storage at the 100-year level (estimated at 10-20 CY, less than a second in peak flow delay at the 100 year storm). A 10-15 foot wide vegetation buffer will be kept along the existing trail and plants on the south side of the stream close to 35th. The small tributary will be graded as originally proposed to increase the gradient to about 2.5% to help move sediment through the system yet still be accessible to fish. However, plants around the tributary will be maintained as the contractor is best able. The design changes are summarized in Figure 1.

3. **Path or overlook**: During review of the 60% design, SPU had not decided whether a path or an overlook should be included at the Confluence site. We requested input from the community on their preference, which we considered alongside habitat and flood storage goals, as well as maintenance and security concerns.

Discussion and Decision:
Weighing flood storage, habitat, maintenance, security, impacts to adjacent neighbors and amenity elements at the site, SPU plans to construct an overlook off of 35th Ave NE and will not include a path to connect 35th and 36th.

While many in the community would like a path, there were a number of concerns that came up with adding a path to the design:

1) A path reduces the habitat available at the site (a goal of the project) and would reduce the quality of that habitat. A path will introduce many people into a large block of the area set aside for habitat, including an area that we hope to have spawning and rearing;
2) The path and bridge over the stream to connect with 36th Ave NE could adds up to $150,000 – $250,000 to the project cost;
3) The bridge will require monitoring during storm events to be sure that debris does not become lodged or create a hazard for the upstream neighbor or the bridge itself;
4) There are a large number of security concerns now at the Meadowbrook site and this path would add to those problems, particularly during dark hours when people do not freely circulate through the area; in addition, there could be safety risks if people try to use the bridge during storms when the stream is high;
5) This places a path within 5-10 feet of neighboring residential properties, which could lead to vandalism and security concerns for those living there, given the existing problems at Meadowbrook;
6) A path would be a nice amenity and create a loop for people to walk; however, there is good access across the stream now, just downstream of the confluence area.

The overlook is preferred as it better integrates with SPU's project objectives while still providing an amenity and opportunity to connect with the stream at the site. The overlook:

1) Preserves the habitat "core" of the project site;
2) Has a smaller price tag than a bridge, less than $100,000 additional cost;
3) Has a smaller footprint than a path and is located entirely in the uplands of the site – this means minimal need for maintenance during storm events and no impact on flood storage;
4) Can be easily seen by passing police and security patrols on 35th Ave NE, which will deter illicit behaviors;
5) Uses the existing screening from plants to integrate well with the site with small effect to neighbors;
6) Will provide a view into an area we expect to see salmon spawning and increase the opportunities for learning and passively engaging with the stream.

4. **Retain straight path from 36th Ave NE into pond**: SPU received a suggestion to keep the current pathway down 36th into the Meadowbrook north entrance, rather than the new

access that curves to the east. This was suggested as a way to surround people with nature better at the site.

Discussion and Decision:
SPU examined this option but it is not feasible. The existing 36th pathway will have to be several feet lower to allow high flows to use the floodway during a large storm. This reduces the cover over the underlying county sewer line, which is only acceptable if no heavy loads will be placed over the line (e.g., no vehicles or other equipment). SPU needs to access the site with our maintenance trucks; with less cover over the sewer line, trucks will no longer be able to use the existing straight 36th alignment. In order to have both the floodway and maintenance access to the site, a new access pathway will be built that does not cross over the sewer line. SPU plans to only build one path here which people and the occasional maintenance vehicle will share.

With the new access path that curves to the east, people will have the opportunity to be surrounded by nature with a more open meadow/wetland on one side and a more forested environment on the other. An informal, social path may develop over time down the 36th Ave alignment and we will not discourage that from happening.

5. **Access road from 36th**: The original 60% design had a new access road from 36th Ave NE into the pond which was expected to flood at larger storm events. The design team discussed elevating the road and installing large culverts underneath to maintain accessibility during larger storm events.

   Discussion and Decision:
   SPU can increase flood storage capacity and maintain maintenance access to the pond during large storm events by elevating the access road above the new floodway area and installing culverts underneath. This allows SPU to also extend the area of excavation and increase the flood storage volume at the site. Please see the floodway item (#6) for more information.

6. **Additional excavation of floodway area to create wetland**: We received a suggestion to expand the floodplain excavation area (see Figure 2).

   Discussion and Decision:
   The additional excavation can add 1,000-2,000 cubic yards (CY) of additional floodplain storage (30-60 seconds of peak flow delay for 100-year storm levels). This additional storage is significant. On the downside, this means removing additional trees. Depending on the extent, up to 11 cottonwood trees and 2 willow trees would be removed. In addition the wetland would increase maintenance needs, which still need to be evaluated.

   SPU has preliminarily decided to add this additional excavation because:
   1) It is significant increase in flood storage volume;
   2) The additional excavation would create a wetland "finger" that will increase habitat diversity at the site and provide native frog habitat.

3) We still need to assess the maintenance implications from this change, and that may affect whether the area is more wetland or floodplain.

While we are not happy with removing trees, we will be replanting the site with native trees, in particular conifers, to increase the quality of the habitat in the long-term. The reality is that trees will re-grow, while floodplain storage is something we cannot replace if we do not create it now.

7. **Parking along 36th**: SPU asked the community for input during the 60% design review about the need for parking at 36th.

   Discussion and Decision:
   Community input indicated little need for parking along 36th. The comments indicated that people feel there is adequate parking at the community center and along 35th Ave NE. However, some comments noted that people with limited mobility visit the pond and that parking at 36th Ave NE should be maintained for them.

   Based on that input, and balancing security and maintenance needs, we do not plan to include formal parking at the site. The gravel shoulder on the east side of 36th will be enhanced to serve as a parking area; however, there will not be an accessible lot. This will help prevent illicit activity like illegal dumping and congregations of people engaging in questionable behavior that occur at the Meadowbrook site now, allow adequate space for maintenance needs of SPU, and provide a small number of parking spots along the street for visitors.

8. **Enlarging Meadowbrook Pond**: The plans for Meadowbrook Pond will expand the storage volume of the pond to increase flood storage; however, to do that, a grove of conifer trees will need to be removed. There was a suggestion to leave an island or a peninsula in the pond to preserve the trees.

   Discussion and Decision:
   SPU evaluated the proposal with regard to flood storage, habitat, maintenance, security and passive recreation. The existing plans maximize flood storage and minimize maintenance and security concerns, but will require SPU to remove some trees. This will change the riparian habitat at the northwestern corner of the pond.

   The conifers could be kept through having them retained on an island. This decreases flood storage by 1,000-2,000 CY, which is a significant amount (up to 60 seconds of peak flow delay, see #6 above). An island is problematic also in construction, as a living wall would have to be used to shore up the banks of the island, and for maintenance since it would be difficult to get out there (e.g., boat perhaps). This would increase construction and design costs, likely by about $50,000-$80,000.

   A peninsula would have a higher impact on flood storage volume since more land would be retained. The peninsula would also promote unwanted behavior since it is easily accessible

but a dead end. However, since it is easily accessible, a peninsula is easier to maintain. The cost difference in a peninsula versus the original excavation amount is negligible.

SPU has decided to keep the original pond expansion designs to maximize our flood storage volume in the area. As mentioned previously, we aren't happy with removing trees. The conifers that are removed will have a new life as large woody debris in the restored stream. We will also replant the site with native trees, and in particular conifers, to increase the quality of the habitat in the long-term. The reality is that trees will re-grow, while floodplain storage is something we cannot replace if we do not create it now.

9. **Alteration of the Meadowbrook Pond bypass structure**: There is a bypass structure located just upstream of Meadowbrook Pond that takes water from Thornton Creek when flows are high. The bypass delivers a portion of the water in the creek directly to Lake Washington, bypassing the stream adjacent to and downstream of Meadowbrook Pond. SPU needs to ensure that the bypass is clear to operate during high flows and that debris is not affecting the intake so that high flows can enter the bypass and not contribute to flood-related public safety concerns downstream. To maintain the bypass, SPU crews often need to get large equipment into the bypass intake area to vactor sediment from the opening of the bypass and to clear debris. SPU plans to increase the width of the path at Meadowbrook Pond that accesses the bypass intake. We received suggestions for how to modify the bypass itself so that dredging and vactor truck access is not needed.

   Discussion and Decision:
   The suggested alterations include: 1) angling the grate at the bypass entrance so debris floats up to the top of the rack and it is easier for crews to push the debris back into the stream to wash up on the downstream trash rack, 2) creating a new angled concrete floor to the bypass entrance so that the entrance self-cleans.

   SPU engineers examined the alternative suggested and do not expect these alternatives would be effective at reducing the need for dredging at the site nor change how debris deposits and moves in the area. Our analysis confirms that the existing Meadowbrook Pond designs will be more effective at facilitating maintenance activities and ensuring worker safety. That will require us to widen some paths at the pond.

10. **Berm between pond and pump station**: SPU received a suggestion to change the berm and paths around the pump station to increase sight lines and deter illicit behavior there.

    Discussion and Decision:
    The berms were originally constructed with the Meadowbrook Pond project and as part of the artwork at the site. SPU's intent has been to avoid altering the berms to the extent that we can do so while meeting the objectives of the improvements at Meadowbrook Pond.

    We have designed the Confluence project floodway area with the existing berm at the pump station in mind and that berm serves a flood protection function. The berm will ensure that the pump station site does not flood when the floodway between the

confluence area and Meadowbrook pond is being flooded. We do not want to alter the berms as it could impact the operations at the pump station during a storm. An open site of the pump station may also negatively affect the aesthetics of the site and the experience for visitors. Also, the new access path into the north side of Meadowbrook Pond will place the area behind the berm into direct view, which hopefully will deter any unwanted behavior in that area.